Re-evaluation Note REV2009-03

Re-evaluation of Endosulfan Interim Mitigation Measures

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Executive Summary

This document provides an update to the Proposed Acceptability for Continued Registration document PACR2004-21, *Re-evaluation of Endosulfan – Interim Mitigation Measures*, published on 25 June 2004 by Health Canada's Pest Management Regulatory Agency (PMRA). Included in this document are 1) a summary of comments received on the mitigation measures proposed in PACR2004-21 and 2) a revised proposal for interim risk mitigation measures.

The PMRA will accept written comments on the interim mitigation measures up to 30 days after the date of publication of this document. Please forward all comments to Publications (please see contact information on the cover page of this document).

Overview

In August 2002, the PMRA announced that it would re-evaluate the insecticide endosulfan (REV2002-04, *Endosulfan*). REV2002-04 also informed registrants, regulatory officials and the Canadian public that the recently announced risk-management plan of the United States Environmental Protection Agency would be acceptable to Bayer and Makhteshim, the manufacturers of endosulfan technical products for Canada.

On 25 June 2004, the PMRA published the Proposed Acceptability for Continued Registration document PACR2004-21, *Re-evaluation of Endosulfan - Interim Mitigation Measures*. In PACR2004-21, the PMRA proposed certain measures in advance of completing the full re-evaluation, as a precautionary approach to mitigate potential dietary, worker and environmental risks. Based on many comments from growers, registrants and regulatory officials to PACR2004-21, the PMRA determined the use pattern for endosulfan that would serve as the basis for completing the re-evaluation. The PMRA reviewed available information and published Re-evaluation Note REV2007-13, *Preliminary Risk and Value Assessments of Endosulfan,* in October 2007 for public comment.

This Re-evaluation Note describes the current intermediate stage of PMRA's regulatory process for the re-evaluation of endosulfan and revises the interim measures proposed in 2004 to mitigate dietary, worker and environmental risks posed by endosulfan. Appendix I summarizes the comments received on the mitigation measures proposed in 2004 and the PMRA's response to these comments. Appendix II provides the revised proposal for interim risk mitigation measures.

Please note that some of the mitigation measures first proposed in PACR2004-21 have been changed in response to comments received, specifically:

- the adjustment to the strawberry use rate;
- retaining the endosulfan use for grapes, sugar beets, greenhouse ornamentals and Japanese yew on the label; and
- updates to the buffer zones.

As in PACR2004-21, the measures outlined in Appendix II include measures to mitigate risks to human health and to the environment, including:

- additional protective equipment, precautions, and packaging of wettable powder (WP) formulations in water soluble bags to protect mixers, loaders and applicators;
- a restricted-entry interval (REI) to protect those re-entering treated sites;
- reduced rates and numbers of applications for some crops; and
- additional advisory label statements and buffer zones to reduce potential surface water contamination.

Next Steps

In the near future, the PMRA will consider comments on this document and make a decision on interim risk mitigation measures to be adopted by registrants of pesticides containing endosulfan.

The PMRA is currently reviewing comments and new data received in response to REV2007-13. The PMRA will propose a risk management strategy for endosulfan in a future document along with the PMRA's assessment of the comments and additional information received and issues related to health, environment and the Toxic Substances Management Policy.

List of Abbreviations

a.i.	active ingredient
cm	centimetre
EC	emulsifiable concentrate
g	gram
h	hour
ha	hectare
kg	kilogram
km	kilometre
L	litre
m	metre
PHI	preharvest interval
PMRA	Pest Management Regulatory Agency
PPE	personal protective equipment
REI	restricted-entry interval
WP	wettable powder

Appendix I Comments and Responses

1.0 Comments With Respect to Human Health

1.1 Comment

The proposed restricted-entry interval of 17 days is not practical for sweet corn production.

Response

The PMRA's Preliminary Risk Assessment (REV2007-13) indicates that a restricted-entry interval (REI) of 10 days would be acceptable for most activities, with the exception of hand detasseling and hand harvesting. For these two activities, additional dislodgeable foliar residue data or a rationale for acceptable re-entry for hand-harvesting were requested in REV2007-13. In the interim, given that the preharvest interval (PHI) for corn is 50 days, the PMRA is proposing an REI of 50 days for hand harvesting and 17 days for hand detasseling. For all other activities involved in growing sweet corn, the PMRA is proposing an REI of 10 days.

1.2 Comment

Why is it being proposed that the PHIs be increased to match the REIs in cases where REIs exceed PHIs?

Response

Exposure for workers entering a treated crop is mitigated by an REI. Although the residues on the crop at the PHI might be acceptable for consumption of a given crop, they are not always acceptable for harvesters performing high contact harvesting of that crop. When the REI for harvesting is greater than the PHI, the PHI is usually increased to be equivalent to the REI. This is done to reduce any confusion regarding when harvesting is permitted.

1.3 Comment

The size selected for the proposed water soluble bags should not encourage applicators to break open the packages to use lesser quantities.

Response

The PMRA agrees that the packaging should be of a practical size that can accommodate growers. It is the role of the end-use product registrant to determine the acceptable size of the water-soluble package. It is suggested that the registrants consult with grower representatives to ensure their needs are met regarding packaging.

1.4 Comment

Provide an alternative to closed cabs for airblast applications as they are not feasible in conventional orchard blocks as tree limbs will be damaged by the cab.

Response

The PMRA recognizes that closed cab equipment is not always feasible for pesticide application in orchards. Open cab equipment where the applicator wears chemical resistant coveralls, chemical resistant headgear, chemical resistant gloves and a respirator is an alternative for airblast application on pome and stone fruit crops. This scenario was considered in the Preliminary Risk Assessment (REV2007-13, page 6).

1.5 Comment

The PMRA has been asked to consider the use of both airblast and handwand applications in orchards.

Response

In the preliminary risk and value assessment of endosulfan, the PMRA assessed the registered use of handwand application to the trunks and limbs of fruit trees in addition to airblast application. Refer to page 6 of REV2007-13 for further details.

1.6 Comment

PACR2004-21 recommends taking off the personal protective equipment if you need to exit the cab and enter the treated area. Can you please clarify?

Response

When using closed cab airblast application equipment, the personal protective equipment (PPE) that should be worn inside the cab is a long-sleeved shirt, long pants, shoes plus socks and a respirator (depending on the respiratory protection the closed cab provides). When exiting the cab in the treated area, the applicator must put on chemical-resistant coveralls, chemical-resistant footwear, chemical-resistant headgear and an approved organic vapour respirator. This additional PPE should be removed prior to re-entering the cab so as to prevent contamination.

1.7 Comment

Under personal protective equipment requirements, the designation "all other workers" is vague. Please clarify.

Response

The PMRA agrees that the wording "all other workers" is vague. As equipment in the PPE section applies to mixing/loading, application, cleanup, and repair activities, the title of this section will be modified. The new title will reflect that the PPE required in this section is the minimum PPE required when handling endosulfan for those activities not covered off in other sections (i.e. workers using high-pressure handwand equipment, applicators using airblast equipment, and early entry to treated areas).

2.0 Comments With Respect to the Environment

2.1 Concerns were raised with regards to the proposed buffer zones required to mitigate contamination of aquatic environments (e.g. the 10 metre vegetative buffer strip and the 30 metre buffer zone).

Response
The PMRA does not currently prescribe labelled vegetative buffer strips to mitigate contamination of aquatic environments. These buffer zones were recalculated using current methodology to mitigate contamination of aquatic environments resulting from spray drift. Please refer to the label amendments in Appendix II under "To Mitigate Contamination of Aquatic Environments the Following Label Amendments Must be Added to the Designated Labels."

For field sprayer applications, however, buffer zones can be reduced by using drift reducing spray shields. When using a spray boom fitted with a full shield (i.e. a shroud or curtain) that extends to the crop canopy, the labelled buffer zone can be reduced by 70%. When using a spray boom where individual nozzles are fitted with cone-shaped shields that are no more than 30 cm above the crop canopy, the labelled buffer zone can be reduced by 30%.

3.0 Comments With Respect to Value

Comments regarding the proposed mitigation measures identified in PACR2004-21 were received by the PMRA. The PMRA's responses regarding the potential impacts of the proposed mitigation measure to limit seasonal application rates for endosulfan were included in REV2007-13. Please consult the Comments column of Appendix V in REV2007-13 for additional information.

3.1 Comments relating to value received in response to PACR2004-21

3.1.1 Use of endosulfan on greenhouse ornamentals is critical for the control of aphids, cyclamen mites and whiteflies. Endosulfan use is critical for resistance management of greenhouse pests.

Response
The technical registrants for endosulfan do not support the use of endosulfan on greenhouse ornamentals; consequently, uses not supported by the registrant were proposed to be phased out. However, as a result of evaluation of the comments regarding the value of endosulfan use on greenhouse ornamentals, removal of this use will not be required at this time. The mitigation measures that are to be applied to greenhouse vegetables will also be applied to greenhouse ornamental uses.

3.1.2 As a result of comments from grower groups and for the purpose of harmonization with the United States, the technical registrants currently support the use of endosulfan on grapes and sugar beets.

Response
The updated use pattern for endosulfan supported by the technical registrants, including grapes and sugar beets, is provided in Appendix V of REV2007-13. These uses are also included in Appendix II of this document.

3.1.3 Concerning the seasonal rate per hectare to control pear psylla on pears, the proposed rate is less than the registered rate.

Response
The lower proposed rate is to limit the volume of active ingredient applied per hectare in a given season. There is no proposed change to the registered spray concentration. The spray volume required per hectare for thorough coverage is based upon the tree row volume for each orchard. The proposed mitigation measure may limit the spray volume that may be applied per hectare, or limit the number of applications that may be made per season. Please consult the "Comments" column in REV2007-13, Appendix V, for details regarding the potential impact of the proposed mitigation rates.

3.1.4 The proposed rate reduction for strawberries is below the registered rate for the control of cyclamen mite.

Response
For several years the registered application rate for endosulfan products formulated as a wettable powder for control of cyclamen mite in strawberry has been 1000–4500 g a.i./ha. The rate for endosulfan products formulated as an emulsifiable concentrate product has been 2000 g a.i./ha. In PACR2004-21, it is proposed that the rate be reduced to 1000–1100 g a.i./ha. As noted in REV2007-13 Appendix V, the PMRA would need efficacy data to support this use claim at the rate of 1000–1100 g a.i./ha for products formulated as an emulsifiable concentrate. In response to additional comments received on REV2007-13, the PMRA has refined the mitigation measures as described in Section 3.2.2 and Appendix II of this document.

3.1.5 The domestic class product containing endosulfan is critical for use on fruit trees in residential areas to control wood borers as wood borers are a major source of pest pressure for orchards in areas where there are significant rural/agricultural boundaries.

Response
The technical registrant supports no residential (and consequently no domestic class product) uses of endosulfan. This use will be phased out. The PMRA acknowledges that fruit trees in a residential setting may act as a potential source of insect pests to nearby orchards. The PMRA is also aware that there are currently no registered alternatives to endosulfan for controlling wood borers (as a general label claim) on trees in a residential setting. The need for options to control insect pests in residential areas that may act as sources of agricultural infestations needs to be identified in future pome and stone fruit transition strategies.

3.2 Comments relating to value received in response to REV2007-13

3.2.1 Comments were reiterated regarding the value of endosulfan for:
- greenhouse ornamental production;
- use on grapes for the control of grape phylloxera; and
- use on residential fruit trees for the control of wood borers.

Response
See the response for 3.1.1; 3.1.2 and 3.1.5. The use of endosulfan on greenhouse ornamentals and grapes has been added to the revised endosulfan use pattern in Appendix II of this document.

3.2.2 Endosulfan use on strawberries: The PMRA received comments regarding the value of endosulfan and the impact of the mitigation measures proposed in PACR2004-21 for:
- strawberry propagation stock; and
- the control of cyclamen mite, tarnished plant bug and aphids.

Response
As a result of the comments received in response to PACR2004-21 and REV2007-13, the use pattern has been revised for endosulfan use on strawberry (see Appendix II of this document). The economic impact of using registered alternative active ingredients to endosulfan for controlling cyclamen mites and tarnished plant bug on strawberries was considered in the refinement of the interim mitigation measures for endosulfan as follows.

The application rate will be limited to 2 kg a.i./ha. The number of applications per season will be limited to two. All other mitigation measures are to be implemented.

Appendix II Revised Label Amendments for Products Containing Endosulfan

Note: This use pattern summarizes risk mitigation measures required for endosulfan products following public consultation on the preliminary risk assessments and interim measures proposed in PACR2004-21, *Re-evaluation of Endosulfan - Interim Mitigation Measures.* It is NOT intended to replace existing use directions on product labels.

The label amendments presented below do not include all label requirements for individual end-use products, such as first aid statements, disposal statements, precautionary statements and supplementary protective equipment. Additional information on labels of currently registered products should not be removed unless it contradicts the label statements below.

COMMON NAME: Endosulfan

CHEMICAL NAME: 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepin-3-oxide

FORMULATION TYPE: EC emulsifiable concentrate
WP wettable powder packaged in water soluble bags.

SITE CATEGORIES: Greenhouse Food Crops (Use-site Category 5)
Greenhouse Non-food Crops (Use-site Category 6)
Terrestrial Food Crops (Use-site Category 14)
Structural (Use-site Category 20)
Outdoor Ornamentals (Use-site Category 27)

Engineering Controls for Wettable Powder Formulations:

- All wettable powder formulations are to be packaged in water soluble bags.

Personal Protective Equipment

a. **Workers using high-pressure handwand equipment**
Wear coveralls over a long-sleeved shirt and long pants, chemical-resistant footwear, chemical-resistant gloves, and an approved organic vapour respirator during application. In addition to this protective equipment, wear a chemical-resistant apron during mixing/loading, cleanup, repair and all other handling activities.

b. **Applicators using airblast equipment on pome and stone fruit crops**
Applicators using airblast equipment on pome and stone fruit crops must either:
(i) use an enclosed and wear a long-sleeved shirt, long pants, shoes plus socks and either an approved organic vapour respirator or an enclosed cab that provides as much respiratory protection as an organic vapour respirator. When exiting the cab in the treated area, the applicator must wear coveralls, chemical-resistant

footwear, chemical-resistant headgear and an approved organic vapour respirator. Those PPE must be taken off before re-entering the cab and stored in a chemical-resistant container to prevent contamination of the inside of the cab;
OR
(ii) use an open cab and wear chemical-resistant coveralls, chemical-resistant headgear, chemical-resistant gloves and an approved organic vapour respirator.

c. **Early entry into the treated area**
If entry into treated areas is required (i.e. prior to the specified restricted-entry interval [REI]), workers must wear coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves, shoes plus socks and either goggles or a face shield.

d. **All other scenarios (mixers/loaders/applicators, during cleanup and repair activities)**
Wear a long-sleeved shirt, long pants, shoes plus socks, chemical-resistant gloves, and an approved organic vapour respirator during mixing/loading, cleanup, repair, application and all other handling activities (where not specified in the previous scenarios [a. to c. above]). In addition to this protective equipment, wear a chemical-resistant apron during mixing/loading, application of dips, cleanup and repair activities.

To Mitigate Contamination of Aquatic Environments the Following Label Amendments Must be Added to the Designated labels

For Use-site Category 5, Greenhouse Food Crops, the Following Label Statements Must Be Added

Environmental Hazards

TOXIC to aquatic organisms.

Directions for Use

DO NOT allow effluent or runoff from greenhouses containing this product to enter lakes, streams, ponds or other waters.

For Use-Site Category 14, Terrestrial Food Crops, the Following Label Statements Must Be Added

Environmental Hazards

TOXIC to aquatic organisms, birds, and small wild mammals.

TOXIC to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. **DO NOT** apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.

TOXIC to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Avoid application when heavy rain is forecast.

Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

To minimize the release of endosulfan into the environment due to volatilization, endosulfan should only be applied on cool mornings and evenings when air temperatures are 15°C or lower. To further reduce volatilization to the atmosphere, incorporation into the soil should occur concurrently with applications.

Directions for Use

DO NOT apply this product directly to freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs, ditches and wetlands), estuaries or estuarine/marine habitats.

DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Field sprayer application:
DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE) fine classification. Boom height must be 60 cm or less above the crop or ground.

Airblast application:
DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** direct spray above plants to be treated. Turn off outward pointing nozzles at row ends and outer rows. **DO NOT** apply when wind speed is greater than 16 km/h at the application site as measured outside of the treatment area on the upwind side.

DO NOT apply by air.

Buffer zones:

Use of the following spray methods or equipment **DOES NOT** require a buffer zone: hand-held or backpack sprayer and spot treatment.

The buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands) and estuarine/marine habitats.

Method of Application	Crop		Buffer Zones (metres) Required for the Protection of:			
			Freshwater Habitats of Depths:		Estuarine/Marine Habitats of Depths:	
			Less than 1 m	Greater than 1 m	Less than 1 m	Greater than 1 m
Field sprayer*	Cucumber, squash, melon, pumpkin, eggplant, pepper, tomato, potato, strawberry		90	40	120	120
	Bean		85	35	120	120
	Broccoli, brussels sprouts, cabbage, cauliflower, lettuce, rutabaga, turnip, peas, corn		75	30	120	120
	Celery		50	20	120	120
Airblast	Apples, pear, apricot, cherry, peach and plum	Early growth stage	70	60	90	80
		Late growth stage	60	50	80	70

* For field sprayer application, buffer zones can be reduced by using drift reducing spray shields. When using a spray boom fitted with a full shield (shroud, curtain) that extends to the crop canopy, the labelled buffer zone can be reduced by 70%. When using a spray boom where individual nozzles are fitted with cone-shaped shields that are no more than 30 cm above the crop canopy, the labelled buffer zone can be reduced by 30%.

Uses for Endosulfan

Use of endosulfan for Domestic Class products is to be discontinued. The following must be added to the labels of Commercial Class products containing endosulfan.

> This product is not to be used in and around homes or other residential areas such as parks, school grounds and playing fields. It is not for use by homeowners or other uncertified users.

Use of endosulfan for the following crops must be removed from labels:

- Alfalfa, clover
- Field corn
- Sunflower
- Spinach
- Succulent beans
- Succulent peas
- Wettable powder uses on field tomatoes, sweet corn, dry beans and dry peas

Use of endosulfan on the following sites may continue, with the indicated rates and restricted-entry intervals. This use pattern summarizes risk mitigation measures required for endosulfan products and is NOT intended to replace existing use directions on product labels.

Site	Formulation and Rate[1]	Restricted-Entry Interval[2, 3]
Use-site Category 5, Greenhouse Food Crops		
Cucumber, tomato	WP and EC formulations: Apply 500–750 g a.i./ha. (Do not exceed 600 g a.i./1000 L of water for application with high-pressure handwand equipment.)	WP and EC formulations: 48 hours
Lettuce, pepper	EC formulation: Apply 600 g a.i./ha. (Do not exceed 600 g a.i./1000 L of water for application with high-pressure handwand equipment.)	EC formulation: 48 hours
Use-site Category 6, Greenhouse Non-food Crops		
Ornamentals	EC formulations: Apply 500–700 g a.i./1000 L of water. (Do not exceed 600 g a.i./1000 L of water for application with high-pressure handwand equipment.) WP formulations: Apply 500 g a.i./1000 L of water. (Do not exceed 600 g a.i./1000 L of water for application with high-pressure handwand equipment.)	WP and EC formulations: 48 hours
Japanese yew	WP formulation: Apply 750 g a.i./1000 L of water (Do not apply using high-pressure handwand equipment.)	

Site	Formulation and Rate[1]	Restricted-Entry Interval[2,3]
Use-site Category 14, Terrestrial Food Crops		
Apple, pear (eastern Canada)	WP formulation: Apply 500–750 g a.i./1000 L. For white apple leafhopper and potato leafhopper, apply 1300 g a.i./ha. Do not exceed 2800 g a.i./ha per season.	WP formulation: 4 days
Apple, pear (western Canada)	WP formulation: Apply 375–500 g a.i./1000 L of water. For white apple leafhopper and potato leafhopper, apply 1300 g a.i./ha. Do not exceed 2800 g a.i./ha per season.	WP formulation: 4 days
Apricot, cherry, plum, peach	Do not exceed 2800 g a.i./ha per season. **Foliar treatment:** WP formulation: Apply 375–750 g a.i./1000L of water. **Trunk/limb treatment:** WP and EC formulations: Apply 700–750 g a.i./1000 L of water to bark on trunk and scaffold limbs. Do not exceed 600 g a.i./1000 L for application with high-pressure handwand equipment.	WP formulation: 4 days EC formulation: 48 hours
Peach (preplant treatment)	EC formulation: Dip roots and crown in a solution of 500 g a.i./100 L prior to planting.	EC formulation: 48 hours
Bean (do not apply to succulent beans)	EC formulation: Apply 600–1000 g a.i./ha/application. Do not exceed two applications per season.	EC formulation: 48 hours
Broccoli, Brussels sprouts, cabbage, cauliflower	WP and EC formulations: Apply 500–875 g a.i./ha/application. Do not exceed two applications per season.	WP formulation: 9 days EC formulation: 4 days

Site	Formulation and Rate[1]	Restricted-Entry Interval[2, 3]
Use-site Category 14, Terrestrial Food Crops		
Lettuce (field, head)	WP and EC formulations: Apply 800–875 g a.i./ha/application. Do not exceed two applications per season.	WP formulation: 4 days EC formulation: 48 hours
Celery	WP and EC formulations: Apply 800–875 g a.i./ha/application. Do not exceed 1100 g a.i./ha per season.	WP formulation: 4 days EC formulation: 48 hours
Corn (sweet)	EC formulation: Apply 1100–1700 g a.i./ha/application. Do not apply more than once per season.	EC formulation: 10 days for all activities except for hand detasseling (17 days) and hand harvesting (50 days).
Cucumber, squash, melon, pumpkin	WP and EC formulation: Apply 500–600 g a.i./ha/application. Do not exceed 2200 g a.i./ha/season. Do not exceed four applications per season.	WP formulation: 3 days EC formulation: 48 hours
Eggplant, pepper	WP and EC formulations: Apply 500–1200 g a.i./ha/application. Do not exceed 2200 g a.i./ha per season. Do not exceed two applications per season.	WP formulation: 48 hours EC formulation: 48 hours
Grape	WP formulations: Apply 500 g a.i./1000 L. Do not exceed 1250 g a.i./ha/application. Do not exceed two applications per season.	WP formulation: 48 hours
Tomato	EC formulation: Apply 600–1200 g a.i./ha/application. Do not exceed 2200 g a.i./ha per season. Do not exceed four applications per season.	EC formulation: 48 hours
Peas (canning, seed) (do not apply to succulent peas)	EC formulation: Apply 600–800 g a.i./ha/application. Do not exceed two applications per season.	EC formulation: 48 hours
Potato	WP and EC formulations: Apply 500–875 g a.i./ha/application. Do not exceed 2200 g a.i./ha per season. Do not exceed four applications per season.	WP formulation: 48 hours EC formulation: 48 hours

Site	Formulation and Rate[1]	Restricted-Entry Interval[2, 3]
Use-site Category 14, Terrestrial Food Crops		
Rutabaga, turnip	WP and EC formulations: Apply 800–875 g a.i./ha/application. Do not apply more than two applications per season.	WP formulation: 4 days EC formulation: 48 hours
Strawberry	WP and EC formulations: Apply 1000–2000 g a.i./ha/application. Do not exceed 4000 g a.i./ha per season. Do not apply more than two applications per season. Spray volume: For cyclamen mite, apply in sufficient water for thorough coverage. For aphids, tarnished plant bug and spittlebug apply in 2000 L/ha.	WP formulation: 5 days EC formulation: 48 hours
Sugar beet	EC formulations: Apply 800–1100 g a.i./ha/application. Do no apply more than once per season. Do not feed treated foliage to livestock.	EC formulation: 48 hours
Use-site Category 20, Structural		
Food processing plant (outdoor areas)	WP formulation: Apply 250 g a.i./22.5 kg bait.	N/A
Use-site Category 27, Ornamentals Outdoor		
Ornamental trees and shrubs	EC Formulation: Apply 500–700 g a.i./1000 L of water. WP Formulations: Apply 500 g a.i./1000 L of water. Do not exceed 600 g a.i./1000 L for application with high-pressure handwand equipment. Do not exceed 2800 g a.i./ha.	WP formulation: 4 days EC formulation: 48 hours
Japanese yew	EC Formulation: Apply 760 g a.i./1000 L. Do not apply using high-pressure handwand equipment. WP formulation: Apply 750 g a.i./1000 L. Do not apply using high-pressure handwand equipment.	WP formulation: 4 days EC formulation: 48 hours

1 Rate range for a given site represents a summary of all registered rates for endosulfan products, regardless of formulation type. Registered rates for specific products may differ, but fall within the specified range.

2 Do not enter or allow worker entry into treated areas during the REI.

3 Where the proposed REI is longer than existing preharvest interval (PHI), the PHI will be increased to match the REI.